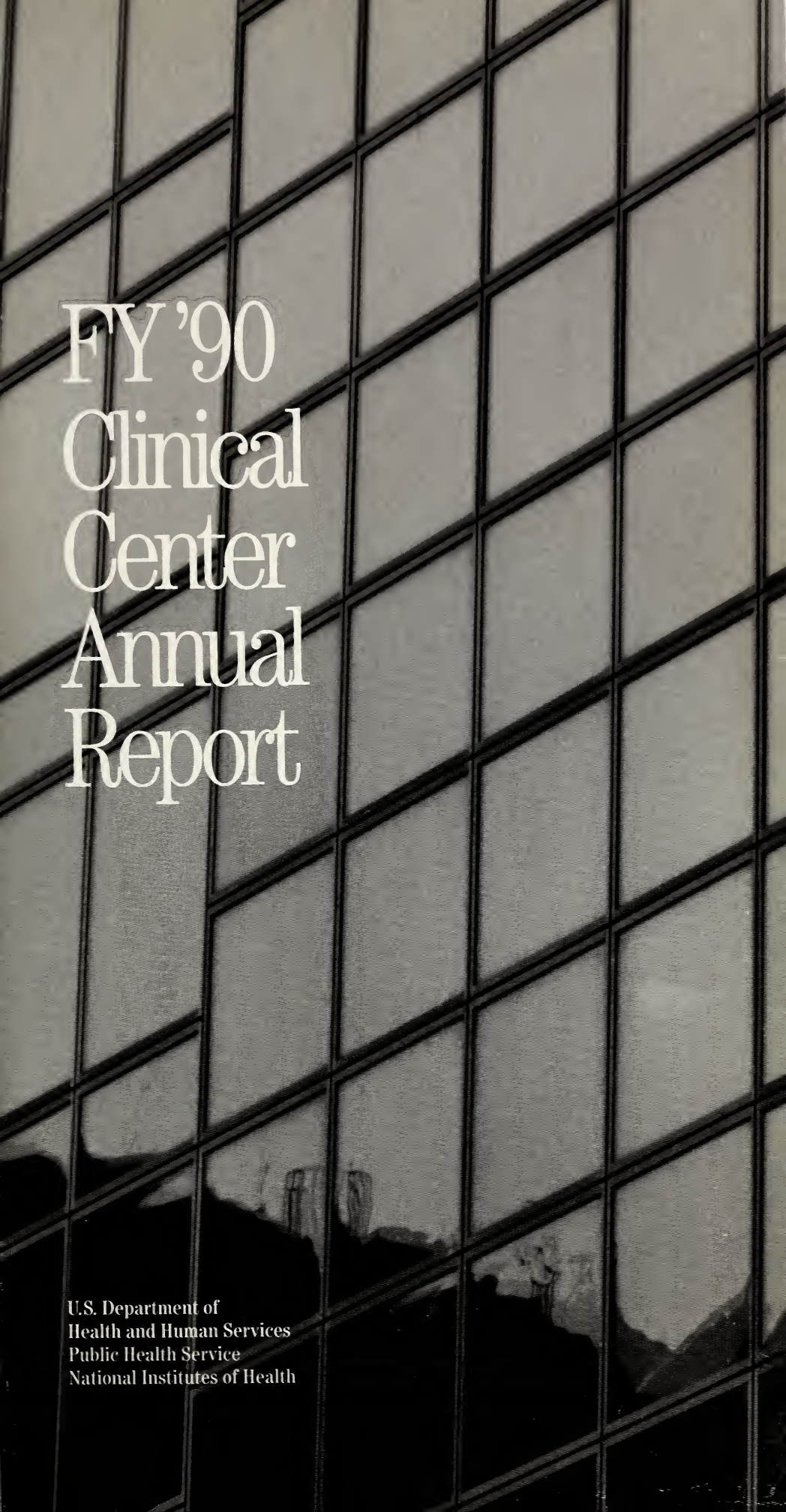

FY '90 Clinical Center Annual Report

U.S. Department of
Health and Human Services
Public Health Service
National Institutes of Health

Foreword

The Warren Grant Magnuson Clinical Center, the world's largest hospital devoted exclusively to clinical investigation, is the research hospital of the National Institutes of Health. In its beds and clinics are patients from 13 institutes* who consent to participate in research studies (protocols) and are treated without charge. Unlike most hospitals, the Clinical Center does not offer general diagnostic and treatment services. Admission is selective: patients are chosen by institute physicians solely because they have an illness under study by those institutes. In all, the Clinical Center houses 4,500 employees, 25 percent of whom hold doctorate degrees; in addition, numerous NIH guest scientists from around the world collaborate in Clinical Center activities. The Clinical Center also offers training in research medicine for young physicians, medical students, and nursing students.

About 9,000 patients are admitted yearly to the 13-story, 500-bed hospital. Another 150,000 visits are made annually to the outpatient clinic. Five hundred healthy people are also admitted each year to serve as normal volunteers. Almost 1,000 physicians offer medical care at the Clinical Center, and more than 700 registered nurses provide care to patients.

A unique feature of the Clinical Center is the closeness of laboratories and patients, often separated only by the width of a hospital hallway. Traffic across this short distance is decidedly two-way. Advances realized in the laboratory are brought to the bedside, and new areas for laboratory investigation are suggested by the health care team's observations of patients. Built in 1953, the Clinical Center was specially designed to foster this exchange of information between basic scientists and clinicians. Indeed, many NIH clinicians are themselves

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**National Cancer Institute; National Eye Institute; National Heart, Lung, and Blood Institute; National Institute of Alcohol Abuse and Alcoholism; National Institute of Allergy and Infectious Diseases; National Institute of Arthritis and Musculoskeletal and Skin Diseases; National Institute of Child Health and Human Development; National Institute of Dental Research; National Institute of Diabetes and Digestive and Kidney Diseases; National Institute of Mental Health; National Institute of Neurological Disorders and Stroke; National Institute on Aging; and National Institute on Deafness and Other Communication Disorders.*

outstanding scientists. Basic scientists in more than 1,200 laboratories work side by side with clinicians caring for patients. More than 2,700 research projects are in progress on the 318-acre NIH campus in Bethesda, Md., making it one of the largest research sites in the world. Worldwide over the years, NIH has supported the work of 76 Nobel Prize winners.

Clinical Center medical departments are specially equipped to serve the needs of biomedical research and patient care. Characterized by state-of-the-art technology and sophisticated training programs for their professionals, they include the departments of Transfusion Medicine, Pharmacy, Diagnostic Radiology, Rehabilitation Medicine, Nuclear Medicine, Critical Care Medicine, and Clinical Pathology. As well, the Clinical Center has other departments devoted to support the nutritional, social, physical, and spiritual needs of patients.

Director's Message

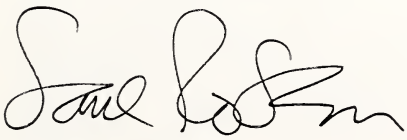
Dr. John L. Decker retired in June 1990 after five years of productive and conscientious service as Clinical Center director. Prior to joining our staff, he was clinical director of the National Institute of Arthritis, Metabolism and Digestive Diseases. He made many valuable contributions to the Clinical Center and NIH, including the recently published monograph,"Protomechanics: Preparing and Conducting a Clinical Research Study." His knowledge and wisdom will be missed, although he will continue to serve the Clinical Center on a consultative basis.

When Dr. Decker retired, I was appointed acting director, and immediately focused on the Easton II imperatives of improving communications, increasing institute involvement in decision making, and establishing a more rigorous financial management process. I met with each clinical director to discuss their scientific agendas and administrative concerns. The budget formulation and execution processes were revamped to include the first Clinical Center Annual Report to the Medical Board, which was submitted in November and is included in this document.

The Clinical Center also has embarked on a new quality management program, "Quality Together," which we hope will reduce costs by decreasing errors and inefficiencies, increase customer satisfaction (including our patients and institute coworkers), improve employee morale and commitment, and encourage more teamwork among employees.

The Clinical Center continues to expand its biomedical training programs and engage in exciting new clinical and research applications, including advances in gene therapy and AIDS treatments.

I look forward to another productive year in 1991 working with the medical board as well as a dedicated and supportive Clinical Center staff. It will be a year in which we will strive to exceed all reasonable expectations through quality together in support of the world's finest research program.



Saul Rosen, Ph.D., M.D.
Acting Director, Clinical Center

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HIN

Office of the Director

Bioethics

The overall mission of the Clinical Center Bioethics Program is to provide leadership and assistance in the development, promotion, and maintenance of high ethical standards in patient care and human research. This mission is fulfilled through research, teaching, consultation, and service as a resource on bioethical issues to the Clinical Center staff, patients, families, and the general public. The Bioethics Program staff ensures that the ethical components of patient care and human research at the Clinical Center receive consistent and careful attention.

The Bioethics Program staff plays an important role in assisting the Clinical Center director with second-level research review of intramural protocols. On a trial basis, members of and consultants to the Bioethics Program sat as non-voting consultants on all 12 institute clinical review subpanels (ICRS) to assist in human subjects review. The evaluation of this one-year pilot project was completed during FY '90 and appears to be a valuable contribution to the review process. In addition, the Bioethics Program offers consultation on request to investigators designing research studies involving human subjects to help address and resolve ethical dimensions of the study. Bioethics consultation has been provided to investigators designing clinical trials and studies involving gene therapy, neonates and infants as research subjects, and collaborative international research involving humans as subjects.

In FY '90, research projects included a study of the use of the durable power of attorney at NIH, a pilot project investigating the role of bioethics consultants to ICRSs, and a research study of NIH physicians' attitudes toward disclosure of information to patients. Several research projects have been initiated including a study of characteristics and motivations of normal volunteers as research subjects, and a large scale study of the process of informed consent at the Clinical Center.

As part of its strong commitment to teaching, the Bioethics Program created a 13-month postdoctoral fellowship in clinical and research ethics. The fellowship is designed to prepare individuals to evaluate research protocols from an ethical perspective, to assist researchers in the informed consent and patient safety aspects of protocol development, to assist researchers in the moral task of protecting human subjects from the risks associated with research participation, and to affirm commitments to patients' rights and welfare. In addition, the Bioethics Program offers various internships, rotations, and other learning opportunities to selected students interested in understanding the interface of ethics to clinical practice and research and the difficult ethical challenges faced by health care professionals and society today.

Numerous educational services have been provided to both Clinical Center staff and to outside professional and civic groups on matters relating to clinical and research ethics. The Bioethics Journal Club, which meets monthly, is flourishing. People from both within and outside NIH have become regular attendees. A graduate course in bioethics has been offered through the FAES program and taught by the Bioethics Program staff. A seminar in philosophy is conducted weekly for members and guests of the Bioethics Program. Educational programs are designed for nursing units requesting inservices on ethical aspects of clinical care; scientists may request discussion groups to be convened to study issues of patient confidentiality, duties to disclose information, and the overall challenge of balancing competing ethical obligations to patients in a research setting.

The consultation service of the Bioethics Program also includes consultations on ethical issues related to patient care. These consultations are requested by researchers, clinicians, policymakers, administrators, NIH officials, families, and patients. The clinical consultation service assists the health care team, patients, and families to resolve difficult problems and value conflicts by facilitating clear ethical reasoning and providing guidance in decision making on difficult cases. The number of bioethics consultations is growing and efforts continue to improve and develop the consultation process. Staff members are available for consultation 24 hours a day seven days a week.

The Bioethics Program staff attends multidisciplinary rounds and patient care conferences on many patient care units. As part of this consultative service, the Clinical Center organized an ethics committee, which presently is undergoing an extensive educational phase.

The Bioethics Program functions as an ambassador to many individuals and groups interested in the ethical dimensions of health care and research, receiving visits and calls from many Fogarty scholars interested in setting up ethics programs for their universities or human subject review mechanisms in their countries.

The John L. Decker Resource Library, established in FY '90, is housed in the Bioethics Office and eventually will contain 200 volumes and article files dealing with bioethics.

Clinical Center Communications

Comprised of public affairs specialists and administrative support staff, the Office of Clinical Center Communications (CCC) serves both the Clinical Center employees and the public community. Within the hospital, support to other Clinical Center departments is

provided through the coordination and production of hospital-wide campaigns to heighten patient, staff, and visitor awareness on topics ranging from privacy rights to security.

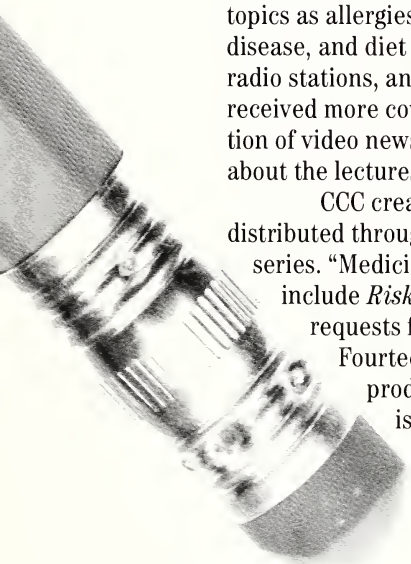
Employees continued to enjoy the Clinical Center newsletter, *CC News*, which was redesigned to include more information and photographs. This publication is circulated to all Clinical Center employees.

FY '90 was a productive year for patient education efforts. CCC produced numerous publications for Clinical Center departments that covered a range of specific therapies and procedures, as well as guidelines for the use of such Clinical Center services as patient activities. To meet the educational needs of non-English-speaking patients, some publications were translated into Spanish and Greek.

The two-year patient confidentiality campaign concluded. The CCC staff assisted the Confidentiality Education Group in developing and implementing the program. Creatively designed posters hung throughout the Clinical Center help maintain staff awareness of the need for greater confidentiality.

In coordination with the Division of Security Operations (formerly the Security Branch), CCC staff continued to implement the Clinical Center Crime Watch Campaign, which emphasizes employees' role in preventing crime. With posters, desk-to-desk flyers, table tents, and giveaways, the two-year campaign promotes such themes as reporting suspicious activity and taking time to lock up possessions. Since the campaign began, crime dropped 32 percent.

Now in its 14th successful season, the "Medicine for the Public" lecture series (formerly "Medicine for the Layman") drew standing-room-only crowds. World-renown experts discussed such interesting topics as allergies, breast cancer, seasonal affective disorder, Lyme disease, and diet and cancer. The series, promoted on television and radio stations, and in newspapers and community calendars, received more coverage this year as a result of CCC's active distribution of video news releases for television and printed information about the lectures.



CCC created original and informative booklets, which were distributed throughout the country, based on the annual lecture series. "Medicine for the Public" booklets produced in FY '90 include *Risks of Heart Disease* and *Osteoporosis.* Copy requests for some booklets have reached 1,000 per month. Fourteen other "Medicine for the Public" booklets are in production. A syndicated column, "To Your Health," also is based on the popular series and enables CCC to reach millions of people who would benefit from information on the latest research at NIH, but who live too far away to attend the lecture series.

The column appeared in 600 newspapers across the country and has been read by an estimated three million people.

CCC continued to win awards in the National Association of Government Communicators annual Blue Pencil Competition. Judges awarded first place to CCC for the poster design of the Patient Confidentiality Campaign; third place for two "Medicine for the Layman" booklets; an honorable mention for a coloring book for pediatric patients; and an honorable mention for the *Warren Grant Magnuson Clinical Center* FY '88 annual report. Thousands of entries are submitted from federal, state, and local government agencies across the country.

In FY '90, the Special Events Section (SES) administered the NIH Visitors Program wherein valuable biomedical information was exchanged. An increased number of high-level local and foreign government representatives, medical professionals, and students met with Clinical Center and NIH administrators, scientists, and clinicians to exchange specific scientific and health information.

SES staff organized the NIH lecture series, including the annual G. Burroughs Mider Lecture and the R.E. Dyer Lecture. SES provides speakers; answers inquiries; and collects, organizes, and makes available information to investigators, educators, practitioners, and the general public. In addition, the staff handles biweekly orientations and tours for new employees, in cooperation with the educational services office.

SES is responsible for providing policy guidance, program direction and coordination, and general oversight of the Jack Masur Auditorium, the Mortimer B. Lipsett Amphitheater, and the medical board room. In addition, the SES staff provides support, consultations, and advice to the Clinical Center, other institutes, and agencies in organizing and arranging conferences, seminars, cultural programs, memorial services, open houses, award ceremonies, and receptions.

Equal Employment Opportunity

The Equal Employment Opportunity (EEO) Office provides advice and training to Clinical Center management on all EEO and affirmative action matters. The office also provides assistance and information to employees who feel they have been discriminated against based on age, color, handicap, national origin, race, religion, sex, or veterans status.

Additionally, the office conducts numerous outreach activities designed to ensure diversity in the applicant pool for Clinical Center employment vacancies. These activities include participation in college career days at historically Black colleges and universities as

well as other minority institutions. The EEO office also interacts and participates with local and national organizations, which are potential referral sources for members of underrepresented groups, and monitors the federal equal opportunity recruitment program.

Hospital Administrative Officers

An eight-member staff of the Clinical Center Executive Office, the Hospital Administrative Officers (HAOs) provide administrative support to the patient care units and special procedure areas within the Clinical Center. The HAOs formulated and implemented an equipment and supply budget that totalled $1.7 million in FY '90.

With insights incorporating the views of management as well as caregivers, the HAOs provide vital representation on a number of Clinical Center committees, including safety, pediatric care, standardization, joint procurement, administrative policy, and patient care unit upgrade. In FY '90, HAOs also began participating on the advisory group planning for a new hospital facility.

The HAOs are the principal Clinical Center representatives for projects involving design and space utilization on patient care units. During FY '90, the HAOs continued their participation in designing upgrades on NINDS and NIMH patient care units, and began designing upgrades on the NIDDK unit. Other areas where renovation projects were planned or completed during the year include 3B South, 6 West, 6D, 5 East, 7 East, 8 West, 10D, 13 East, 11 West, and day hospitals on 9 East and 12 East. Planning also began for the bone marrow transplant unit and its associated support areas. In addition, the HAO staff initiated the procurement of a new nurse call system after developing criteria, coordinating demonstrations, and conducting site visits.

As key players in several Clinical Center and government-wide activities, HAOs were involved in leadership roles in the Combined Federal Campaign, Friends of the Clinical Center, U.S. Savings Bond Drive, and the National Disaster Medical Assistance Team. In FY '91, HAOs will help plan festivities surrounding the 40th anniversary of the Clinical Center.

Hospital Epidemiology Service

The Hospital Epidemiology Service (HES) monitors the occurrence of nosocomial (hospital-acquired) infections, investigates clusters or outbreaks of such infections, and devises policies and procedures to prevent them. The service also educates staff and patients regarding prevention of nosocomial infections and conducts research into the epidemiology, pathogenesis, and prevention of infections. During FY '90, HES staff members kept busy responding to patient and staff concerns about the possible transmission of human immunodeficiency virus (HIV), which causes Acquired Immunodeficiency Syndrome (AIDS); hepatitis viruses; tuberculosis; chicken pox; and other infectious diseases.

HES continues to focus on HIV in the health care setting, disseminating current epidemiologic information (data on incidence and distribution), and emphasizing the similarities of the epidemiology of HIV to that of hepatitis B. In order to minimize the potential for work-place or occupational transmission of HIV and hepatitis B, HES continues to revise isolation precautions specifically designed to eliminate exposure of health care workers to blood or body fluids of infected patients.

Also during FY '90, HES staff continued training Clinical Center staff in the practice of "Universal Precautions," in accordance with guidelines established by the Occupational Safety and Health Administration. Universal Precautions are designed to minimize the potential for the nosocomial transmission of HIV, hepatitis B, and other blood-borne pathogens.

The HES staff conducts numerous other educational sessions, both formally and informally, for virtually every Clinical Center department and many institute programs. All employees are made aware of the presence of HIV-infected patients and patients with other blood-borne pathogens, given up-to-date information about HIV and its epidemiology as it becomes available, and afforded the opportunity to voice their concerns and questions.

The HES staff conducts numerous educational programs for professionals and non-professionals in the community to minimize confusion about HIV. Many medical, nursing, and technical associations, as well as lay organizations, contact HES for information, to answer questions, and to allay fear of this disease.

To evaluate the precise risk associated with exposure of employees to HIV-infected blood or body fluids, HES and the Occupational Medical Service (OMS) continue to conduct a prospective study in which antibody levels to the organism are measured in annual or more frequent blood samples. The risk has been found to be so small that it is difficult to measure.

Other HES studies have evaluated the potential impact of Universal Precautions on decreasing health care worker exposure to patient blood and body fluids. Significant decreases in exposures to blood and body fluids have occurred among Clinical Center staff since the implementation of Universal Precautions.

HES is involved in numerous collaborative employee vaccination programs designed to minimize the opportunities for disease transmission in the Clinical Center. The hepatitis B immunization program continues in collaboration with OMS and the Department of Transfusion Medicine. In cooperation with OMS, all Clinical Center employees are encouraged to obtain annual influenza vaccinations. Because of the increasing public health importance of measles, an employee measles vaccination program was initiated by HES, in cooperation with OMS and the Clinical Pathology Department.

HES also conducts a computer-assisted daily review of antibiotics prescribed by physicians in the Clinical Center to help ensure that antibiotics are used appropriately to prevent and treat infections.

Management Support Services

FY '90 was a banner year for the Office of Management Support Services (OMSS). With responsibilities for financial management, personnel operations, and educational services within the Clinical Center, OMSS managed the largest budget, processed the most personnel actions, and provided more training opportunities than ever before.

The actual budget of the Clinical Center totalled $187.5 million and 2,031 FTEs. This was within $7,600 of the proposed budget, a variance of .004 percent. Initiatives begun by the budget office in FY '90 include: a project to assess prospectively the impact of new protocols; a manager's handbook with the budgetary language of the Clinical Center; a historical analysis of other service costs; a financial audit of the Clinical Center art program; and a study of the biomedical engineering and instrumentation program charges.

The Personnel Office processed more than 14,000 personnel actions in FY '90, a three percent increase over FY '89 and 10 percent over FY '87. The NIH division of personnel management

conducted a major audit of personnel activities. The audit went well, with only minor discrepancies noted despite the high volume of actions reviewed. The number of employee relations cases exploded in FY '90 and has become a major workload factor. The office processed 1,486 quality step increases and employee performance management system bonuses, totalling more than $1.02 million. Initiatives continued to evaluate and expand the use of Title 38 authorities as well as maintain a competitive position in the hospital labor market in the Washington area through the use of special pay rates for nurses and allied health specialists.

The educational services office processed 3,100 training requests. Other programs initiated or enhanced during the year include: an exchange of educational opportunities with Shady Grove Hospital; management of the physical fitness and nutrition fairs; continuation of the successful "Living with Dying" series; coordination of the Cross-Cultural Health series; and assistance in translating the nutrition department menus into French, Spanish, and Greek for foreign patients. In addition, the office oriented close to 500 new Clinical Center employees.

Medical Board Services

The Office of Medical Board Services provides staff assistance to the Medical Board, the organization that develops and recommends policies governing standards of medical care at the Clinical Center. The office sets the agenda for the meetings and serves as the executive secretariat for the board, maintaining the files and carrying out board decisions as necessary.

The office also assists the Clinical Center director by maintaining the medical-administrative policies that govern the provision and assurance of high-quality patient care. During FY '90, a number of new policies were issued. In collaboration with members of the Credentials Committee, six policies were written to codify procedures used to grant credentials and clinical privileges to health care providers at the Clinical Center. Other policy issuances concerned the donation of organs and tissues for transplantation and the immunization of hospital personnel against measles.


MICKEY

Medical Departments

Anesthesia

Anesthesia support and clinical care for Clinical Center patients are provided by an in-house division of Georgetown University's department of anesthesia. The section provides medical consultations in the areas of pain therapy, critical care, and resuscitation; offers professional support to the various institutes in investigational programs; participates in teaching anesthesia and advanced cardiac life support to post-graduate physicians; and initiates primary clinical investigations.

In FY '90, anesthesia and supportive services were provided in 2,045 instances, including 123 emergencies and 143 open-heart procedures. The recovery room staff cared for 1,385 patients, including 337 outpatients.

Four Georgetown residents rotate through the Clinical Center at one time. Three residents receive training in general surgery cases, and one resident rotates through the medical intensive care unit. During this rotation, the resident cares for critically ill medical and post-surgical patients. The resident obtains experience in invasive monitoring, respiratory care, and clinical research studies.

An ongoing advanced cardiac life support course (ACLS), sanctioned by a local chapter of the American Heart Association and accredited for 16 CME credits, has been offered by the Anesthesia Section since 1980. In FY '90, four courses were presented and 63 ACLS providers certified. In addition, courses in basic cardiac life support also were conducted in conjunction with Occupational Medical Service.

In FY '90, inservices included universal precautions, safety and risk management, fire safety, compression nerve injuries, and transfusion reactions.

Six medical students participated in the anesthesia fourth year clerkship last year. During the four-week elective period, the students received didactic teaching and hands-on experience in the operating room. Faculty presented a comprehensive schedule of topics on anesthesia to the students. Each student worked with a faculty member and was given various preoperative, intraoperative, and postoperative assignments during the course of case management. An oral examination was given at the completion of the rotation. Students were encouraged to attend the departmental monthly inservice meetings.

Clinical Pathology

The Clinical Pathology Department is divided into five sections: clinical chemistry, hematology, immunology, microbiology, and phlebotomy. In FY '90, the 7th edition of the *Clinical Pathology and Transfusion Medicine Guide* was prepared, printed, and distributed to patient-care physicians. The guide lists all tests available through the Clinical Pathology and Transfusion Medicine departments, specimen requirements, and a reference interval if appropriate. The department received accreditation as a clinical laboratory for a period of two years from the College of American Pathologists.

The clinical chemistry service continued its efforts to expand the menu of tests offered and to enhance both the quality and timeliness of its services. New measures were developed to monitor and troubleshoot turnaround times of STAT results in order to maintain timely return of results in the face of increasing demands for this service. Serum-ionized calcium was introduced during the year, while a number of other tests currently sent to commercial laboratories was brought closer to in-house performance. Research activities were brisk and varied. A study of the effect of magnesium on the lipid metabolism and longevity of Watanabe hyperlipidemic rabbits was concluded. The results show that a diet high in magnesium increased the average life span of these rabbits three-fold compared to those receiving a diet with a normal magnesium content. A study of normal volunteers showed that serum, red blood cell, and mononuclear blood cell magnesium concentrations do not vary with age or sex. New technologies for measurement of intra- and extracellular free cations were under development. The ability of apolipoproteins to diminish the fever response of rabbits to endotoxin was demonstrated. A mathematical model of the biological variation of blood cholesterol was developed. The effects of surfactants on the kinetics of the enzymatic assay for cholesterol were studied. Oligoclonal immunoglobulin bands were detected in the serum of patients with chronic viral hepatitis and used to differentiate types of hepatitis as well as to follow the course of the disease. Limitations of immunoassays for thyroid function were identified and described.

The hematology service conducted research on coagulation and thrombosis. Studies continued on the effect of Suramin on blood coagulation. Suramin has a direct inhibition of specific coagulation proteins, particularly factor V. DDAVP, an agent that shortens the bleeding time and reduces blood loss during surgical procedures, was shown not only to effect the release of von Willebrand factor from stored sites, but also to prime platelets to respond to doses of agonists ordinarily insufficient to cause platelet aggregation and release. Studies with a 25 kilodalton fragment of von Willebrand

factor that encompasses part of the amino terminus of the von Willebrand factor monomer effectively blocks von Willebrand factor and thrombin binding to platelets and inhibits platelet adhesion to subendothelial surfaces. This fragment, which does not contain carbohydrate and is not cross-linked, may be effective in inhibiting thrombus formation. A monoclonal antibody was produced that blocks the binding of thrombin to its platelet receptor. This antibody, which is directed against the platelet receptor, totally inhibits thrombin-induced aggregation, release and calcium mobilization, and also blocks normal platelet adhesion to subendothelial surfaces. The antibody may be a potent antithrombotic agent. Biochemical analysis of heparin-like anticoagulants in two patients indicated that heparin sulfate and trace amounts of other glycosoaminoglycans are the main cause of the bleeding diathesis related to these anticoagulants. Assays for the immunologic and functional characterization of anti-thrombin III and alpha 2 antiplasma were achieved during FY '90. An assay has been developed that examines the binding of plasma factor VIII to von Willebrand factor. This assay is being employed to evaluate the interaction of these two proteins in patients with von Willebrand disease. A clinical protocol was implemented that compares the efficacy of heparin anticoagulation and fibrinolytic therapy in the treatment of catheter-induced venous thromobosis.

The immunology service provides laboratory support for inpatients and outpatients in the Clinical Center. The service is actively involved in new test development and method evaluation in order to fill specific clinical research needs as well as the general diagnostic immunologic requirements. The in-house development of anti-neutrophil antibody testing is now being applied to all Wegener's granulomatosis patients while also being evaluated in other body fluids. The application of flow cytometric-based immunophenotyping has been included in a number of new research protocols including the gene transfer experiments in ADA deficiency severe combined immunodeficiency. These studies also are used in a number of other patient groups. Patient studies have doubled over the last year. The service is involved in education with special attention paid to enhancing medical staff understanding of the appropriate application and interpretation of diagnostic laboratory immunology tests and results.

The microbiology service continued both developing rapid methodology for the diagnosis of pathogenic microorganisms and cooperating with clinical staff in the investigation of a variety of infectious disease problems. A major emphasis of the service continued to be the study of *Pneumocystis carinii.* Research is in progress both to optimize techniques for the recovery of this organism from clinical specimens and to assess the relative sensitiv-

ity and specificity of newer detection procedures, such as fluorescent fungal stain in comparison with more traditional techniques. An ELISA method for the detection of rotavirus and adenovirus, and a shell vial based method for the detection of cytomegalovirus, have been evaluated and may soon be incorporated as part of the routinely offered procedures of the service. Several specialized media for the more rapid detection of specific organisms in clinical specimens are being developed. An example of these is yeast differential agar, a medium that helps distinguish among different yeast specimens at initial isolation and now is in routine use. Nonradiometric DNA probes for the identification of certain species of mycobacteria recently became available and have been incorporated as part of the routinely used methodology of the service. Investigations of microsporidia have begun with the hope of developing diagnostic procedures that can be performed with methods generally available in the diagnostic procedures that will not require electron microscopy. The assessment of a commercially available automated system for identifying bacteria and for performing susceptibility testing continues; this instrument may be incorporated into the routine work flow of the service in the future. The consultative activity with other NIH infectious disease groups continues, and a number of different studies are ongoing that assess the utility of various diagnostic methodologies, such as bronchoalveolar lavage for specific infectious diseases. Also ongoing are analyses of the impact of specific pathogens on the course of illnesses such as particular types of malignancies.

The phlebotomy service began using bar code labels for accessioned specimens. The bar code label is read by several of the high volume analytical systems in the laboratory and provides a positive sample identification. Thirteen members of the phlebotomy service became certified phlebotomy technicians during the year. More than half of the members of the phlebotomy service have achieved this recognition status. There is continuing difficulty for the retention of competent phlebotomists. The personnel department is evaluating a special pay rate for members of the phlebotomy service.

Critical Care Medicine

The Critical Care Medicine Department (CCMD) directs the medical intensive care unit and provides consultative services for seriously ill patients, supervises respiratory therapy and hemodynamic monitoring, provides critical care training, and conducts research on basic and clinical problems relevant to seriously ill patients.

Frequently patients have serious, life-threatening problems that require the special skills of critical care physicians and specially trained nurses and technical personnel. During FY '90, CCMD admitted 260 seriously ill adult and pediatric patients for 1,381 days of intensive care. An additional 931 patients were admitted for short-term stays for such clinically indicated and protocol-required invasive procedures as bronchoscopy, heart biopsy, right heart catheterization, and central line placement. The majority of the CCMD patients continued to be admitted from the National Cancer Institute (49 percent) and the National Institute of Allergy and Infectious Diseases (35 percent), although every institute used CCMD services at some time during the year.

The primary responsibility and focus of CCMD is patient care. Many therapeutic regimens in the National Cancer Institute, National Institute of Allergy and Infectious Diseases, National Heart, Lung, and Blood Institute, and other institutes require the ability to support adult and pediatric patients through critical illnesses that include difficult management problems induced by chemotherapy, radiation, or surgery. The number of patient admissions increased by 33 percent since FY '89. The amount of respiratory therapy and hemodynamic monitoring provided did not decrease since FY '89, despite the closure of the 2WCSR cardiac surgery unit. Several institutes continue to increase their study of patients with more advanced and life-threatening problems.

Critical care medicine is recognized as an official subspecialty by internal medicine, surgery, anesthesiology, and pediatrics. CCMD has trained four fellows each year since 1982 and fellowship graduates currently occupy leadership positions in academic institutions across the country.

The department's research is collaborative with the institutes' and focuses on septic shock, diffuse pneumonias, the effects of endotoxin, AIDS, and respiratory mucous production. The sophisticated facilities of the department make possible important studies that are difficult to perform at other institutions. These results are published regularly in high quality peer review journals and have brought the department national and international recognition. The department has made major contributions in these areas, most notably in delineating the role of endotoxin in producing hemodynamic changes in humans, demonstrating the role of sputum for diagnosing pneumoaptis pneumonia by non-invasive techniques, developing new therapies for septic shock, and developing new therapies for treating the infectious complications of AIDS.

Diagnostic Radiology

FY '90 saw major advances in magnetic resonance imaging, pioneered by several members of the Diagnostic Radiology Department. Most exciting was the realization that the non-invasive measurements of diffusion in tissue may soon be a reality. Some researchers are using echoplanar techniques for the rapid (100 milliseconds) acquisition of MR images to measure abnormalities of diffusion in brain tumors. Acquisition times of 100 milliseconds allow the measurement of diffusion in even rapidly moving organs, such as the heart. In addition, these experiments suggest the possibility of separating perfusion (microcirculation through the capillaries) from diffusion and thereby achieving a major advance in evaluating blood flow throughout a variety of organs and tissues. These advances were highlighted at an international symposium on perfusion/diffusion imaging sponsored by the Society of Magnetic Resonance in Imaging.

A second major advance in MR technology involved using the recently introduced paramagnetic contrast agent that behaves like inulin. Researchers used high speed magnetic resonance imaging to quantitate glomerular filtration both in normal kidneys and in a variety of renal diseases ranging from ureteral obstruction to early nephrotoxic changes during cisplatinum chemotherapy. A spin-off of this imaging project, the use of gadolinium-DTPA as a renal function test by measuring relaxation times (T1 and T2) in urine, recently was awarded a U.S. patent. If this test fulfills initial expectations, it may replace the more complex inulin and isotopic studies for measuring glomerular filtration.

Both the diffusion/perfusion imaging project and the renal function test evolved from collaborations between investigators from various institutes, members of the Clinical Center Diagnostic Radiology Department, and the staff of the In Vivo NMR Center. These productive collaborations attest to the soundness of conception and the collegial implementation of this new research entity on campus. The In Vivo NMR Center soon will acquire a 4 Tesla whole body magnet to perform MR spectroscopy on patients with a variety of metabolic, neurologic, and oncologic problems. Only a handful of 4 Tesla clinical imagers exist and most are in the research laboratories of major equipment manufacturers. The availability of such an instrument in a setting dedicated to biological and clinical research will offer unique opportunities for advances in the field of MR spectroscopy.

Advances in computed tomography include the ability to perform subsecond CT scanning by replacing the x-ray tube, which has limited heat storage capacity, with a giant electron gun as a source of photons. Serial 100-millisecond scans are possible with this

instrument, which currently is being installed in the radiology department. A variety of cardiological and hemodynamic investigations are planned for this unique imaging device.

The introduction of flow-sensitive color Doppler expanded the applications of ultrasound to a variety of vascular and oncologic problems. Flow Doppler studies of the lower extremities replaced time-honored venography for the diagnosis of thrombophlebitis. The ability to evaluate blood flow in masses using color flow Doppler spurred intense interest in applying this new modality to differential problems. For example, lymph nodes and parathyroid adenomas in the neck may have some similar ultrasound appearances but different Doppler flow characteristics by virtue of their different blood flows. Members of the ultrasound section of the Diagnostic Radiology Department received the 1990 Stauffer Award for the best clinical paper published in *Investigative Radiology*, the official journal of the Association of University Radiologists.

Total clinical demands remained relatively stable and for the first time the requirements for CT examinations did not increase. However, in spite of the installation of a second .5 Tesla magnetic resonance scanner, the delay for MR scans continues to increase, fueled by the growing number of useful new diagnostic applications for this modality. Programs for non-invasive imaging vessels (MR angiography) and the potential for *in vivo* spectroscopic analysis of tumors will create more demands on limited MR resources. Plans for the acquisition of a second 1.5 Tesla scanner in the In Vivo NMR Center will improve but not solve this problem.

Nuclear Medicine

The Nuclear Medicine Department (NMD) performs research and provides support services in positron emission tomography (PET), which permits *in vivo* measurement of regional physiological and biochemical parameters. It employs specialized scanners to obtain images of the distribution of positron-emitting radiopharmaceuticals in the body, and mathematical models and image analysis to obtain the desired measurements from these images. At NIH, PET is a collaborative effort among several institutes and the NMD radiochemistry and PET sections. PET studies are central to numerous research protocols in NINDS, NIMH, NIA, NIDDK, and NHLBI. Many PET radiopharmaceuticals and methods are available or under development, including techniques to study local blood flow and blood volume; glucose, oxygen, and fatty acid metabolism; transmitter-receptor systems; distribution of labelled drugs; and blood-brain barrier function.

The radiochemistry section has at its disposal two medical cyclotrons, six "hot" cells, and several radiochemistry laboratories. The section is responsible for the routine production of established PET radiopharmaceuticals, as well as the development of new radiochemical syntheses. The syntheses are being automated for certain popular radiopharmaceuticals, such as ^{18}F-dopa and ^{18}F-fluorodeoxyglucose. New radiopharmaceuticals recently made available include ^{18}F-insulin to study insulin receptors; ^{11}C-acetate to measure myocardial oxidative metabolism; and ^{18}F-difluoropalmitate to study fatty acid turnover. There also has been considerable work to implement the synthesis of ^{11}C-labelled ligands that are used to study neuroreceptors in the brain.

The PET section supports PET imaging at NIH and performs research in the development and application of PET methods. There are three PET tomographs in the department, two brain scanners and a whole body unit, all linked to a VAX 8600 computer that supports the storage and analysis of PET images. Many NIH clinical research protocols involve PET, including studies in Alzheimer disease, epilepsy, Parkinson disease, brain tumors, depression, schizophrenia, and myocardial disease. There is a growing interest in mapping normal brain function with PET; ^{15}O-water is used to obtain images of blood flow during different cognitive or behavioral tasks. New developments include the use of ^{82}Rb, a generator-produced radiopharmaceutical, to assess the blood-brain barrier in brain tumor patients; the design of kinetic modeling techniques to study opiate and insulin receptors; and the development of methods to improve the quantitative accuracy of PET.

NMD research also continues in the diagnostic and therapeutic applications of murine monoclonal antibodies (MoAbs) in patients with cancer. The department is evaluating the utility of radiolabeled antibodies directed against colorectal, ovarian, and lung carcinomas or lymphomas. These trials focus on the diagnostic and therapeutic applications of these reagents. The diagnostic and therapeutic work in colorectal and ovarian carcinomas continues. Building on previous work, the staff is evaluating a second generation of reagents selected for improved characteristics *in vitro* and better localiza-

tion in animal tumor models. As a result of excellent imaging with In-111-T101 in patients with cutaneous T-cell lymphoma and chronic lymphocytic leukemia, the department started a phase 1 therapy trial. Researchers will focus on new protocols using antibodies against hematologic malignancies (adult T-cell leukemia and B-cell lymphomas).

Rehabilitation Medicine

The Rehabilitation Medicine Department provides treatment to hospital patients who need physical and occupational therapy, speech and language evaluation, and physical medicine. The staff works with patients and helps them reach their greatest functional potential. The department has been active in treating and evaluating a variety of clinical problems, including disabilities associated with cancer diagnoses, HIV infection, and cardiac and musculoskeletal disorders.

The department made significant advances in several areas. Isometric exercise strategies for patients with inflammatory myositis (polymyositis) show that these patients can be strengthened without causing a rise in muscle enzymes, suggesting that isometric exercise can be used safely in this population.

The application of ultrasound imaging of the oropharynx has permitted clinicians to identify abnormalities in swallowing, sucking, and suckling in infants and children. Treatment can be planned after the causes of dysphagia are identified.

The biomechanics laboratory (BML) implemented standard testing procedures for measuring gait in persons with rheumatoid arthritis, limb sparing surgery, and osteogenesis imperfecta. This provided clinicians with an opportunity to use the facility in a more routine fashion, increasing the frequency and ease with which patients are processed in the BML.

Transfusion Medicine

In FY '90, the Department of Transfusion Medicine (DTM) moved from temporary quarters to a state-of-the-art facility that includes modern laboratories, attractive and comfortable surroundings for blood donors, and safe, efficient treatment clinics for hospital patients. Included in the new department are designated areas for cell culture, cryopreservation, radiolabelling, and tissue typing, as well as library and conference facilities appropriate for a department with an extensive educational component. The new department promises to enhance service to Clinical Center patients and

expand the research support that has placed transfusion medicine in the Clinical Center among the leaders in this discipline.

Blood collection at the Clinical Center remained stable during FY '90, although there has been a shift in component usage. Approximately 7,000 units of red cells were transfused, a 13 percent decrease that resulted when the cardiac surgery program was terminated. Platelet transfusions, on the other hand, increased to almost 30,000 units, reflecting more aggressive cancer therapy protocols and autologous bone marrow transplantation. Once again the department supplied all platelet, plasma, and white cell components that were needed for Clinical Center patients, and an expanded red cell recruitment effort has increased in-house collections to about 70 percent of total hospital requirements. In addition, the department helped several local military hospitals meet their blood needs during staff shortages occasioned by Operation Desert Shield.

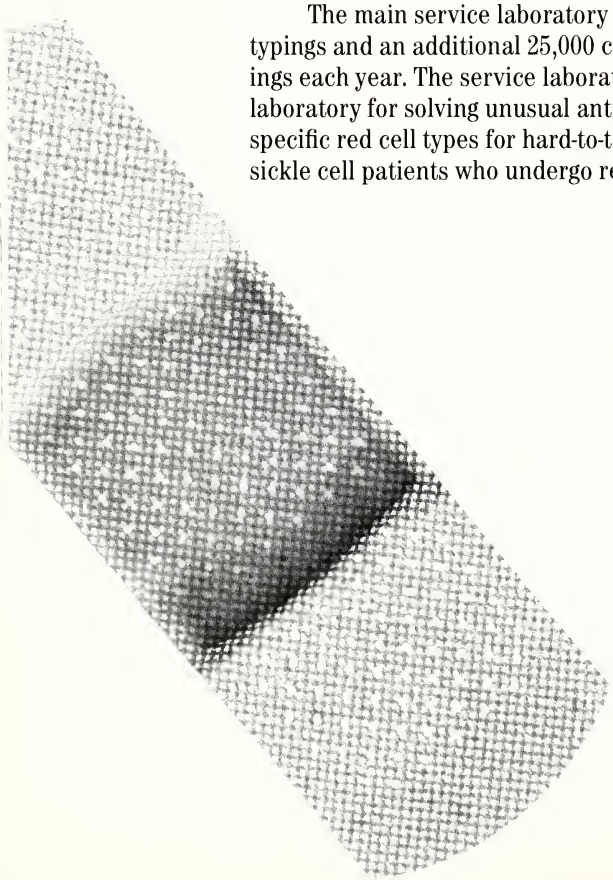
Of particular note during the past year is the continued growth of the unrelated marrow donor program, the Clinical Center component of the National Marrow Donor Program. Spurred by appeals for several local residents, department personnel combined with local government and private industry to recruit and type volunteer donors for a possibly life-saving bone marrow donation. More than 13,000 potential donors have been recruited and entered into the national computer file, and 17 marrow donations have been sent to patients throughout the United States. One recipient of NIH donor marrow, a young Canadian woman who is now disease-free and well more than a year after her marrow transplant, recently joined the Clinical Center donor recruitment team.

The immunology section's service and research functions involve transfusion-transmitted diseases. During the past year, the section performed more than 100,000 tests for a variety of blood-borne agents including the viruses responsible for AIDS and several forms of hepatitis. With the introduction of routine testing for hepatitis C, the virus that causes most transfusion-associated hepatitis, testing increased almost 30 percent compared to FY '89. While the majority of the testing was performed on donated blood and on diagnostic specimens from hospital patients, several important research reports emerged from this work as well. Studies in this laboratory have contributed to improvements in hepatitis C testing technology that should substantially improve the screening of donated blood. Finally, an infectious agent that has been implicated as a possible co-factor in the activation of the AIDS virus, first identified in this laboratory in collaboration with investigators at the Armed Forces Institute of Pathology, was confirmed by French scientists at the Pasteur Institute in a report presented at the International AIDS Symposium in San Francisco.

FY '90 has been an historic year in the department's hemapheresis and cell processing area. In collaboration with investigators from NHLBI and NCI, the department collected and processed cells for the first therapeutic gene transfer trial. Lymphocytes from a four-year-old patient with adenosine deaminase (ADA) deficiency, a severe inherited disorder of the immune system, were collected, separated, grown in culture, and transfected with a normal ADA gene. The gene-modified cells have been transfused back to the patient and she is being followed closely. With this first somatic cell gene therapy procedure, medicine enters a new era and transfusion medicine takes on a new and important role.

The department also collaborated with NCI to perform the first peripheral stem cell transplantation in the Clinical Center for a child with T-cell leukemia. Bone marrow precursor cells, so-called "stem cells," ordinarily circulate in small numbers in human blood. Peripheral stem cells were collected from this patient with a blood cell separator, processed in the laboratory to remove leukemia cells, frozen, and transfused back to reconstitute her bone marrow after her leukemia had been treated with combination chemotherapy. More conventional techniques of marrow processing and frozen storage also were carried out by the department for close to 50 patients during the year.

The main service laboratory performs more than 10,000 blood typings and an additional 25,000 crossmatches and antibody screenings each year. The service laboratory includes a red cell reference laboratory for solving unusual antibody problems and identifying specific red cell types for hard-to-transfuse patients, for example sickle cell patients who undergo repeated red cell exchange proce-



dures. Developmental research in this laboratory involves such practical problems as how well red cells tolerate refrigerated storage after they have been irradiated. Studies from this laboratory were critical in assisting FDA scientists to develop their guidelines.

The service laboratories also perform tissue-typing (HLA) for the purpose of transfusion compatibility, organ transplantation, and family studies, and can radiolabel cells to determine their survival and distribution after transfusion. While such technical capabilities provide essential patient support services for detecting occult infection and for selecting compatible platelets, they also provide research opportunities, for example, to determine whether white cells grown out of surgically removed tumors can be used to detect or treat residual cancer.

DTM continues to train medical and technical professionals in the discipline of transfusion medicine. The staff fellowship program, accredited by the American Council of Graduate Medical Education, enters one physician each year into a two-year program of service and research. A specialist in blood banking (SBB) program enrolls three students in a one-year program. Again in FY '90, two of five competitive research scholarships awarded by the American Association of Blood Banks were won by students in this program. Department personnel conduct extensive in-service education programs for Clinical Center physicians and nurses. For the last nine years, DTM has sponsored a one-day scientific symposium devoted to recent advances in transfusion medicine, last year focusing on the role of transfusion in bone marrow transplantation. DTM is recognized nationally for its excellence in service, research, and education.

Patient Care Services

Nursing

Innovations in clinical care are an integral part of nursing practice at the Clinical Center. The unique patient population and the challenges of clinical research combine to form an environment for creativity. As a result, the nurses of the Clinical Center Nursing Department are able to optimize their expertise and provide the highest quality of care.

Many programs were implemented during FY '90. Day hospitals opened on 12 East (NCI) and 9 East (NIAMS and NIDDK). This setting provided greater flexibility and responsiveness to specific studies and patient populations. Other strategies to increase efficiency and maximize nursing resources include the Pediatric Intensive Care area, which opened on 10D in January 1990; the AIDS outpatient programs, which expanded to the 8th and 11th floor clinics; the cardiac surgery program, which closed; and the bone marrow transplant unit, for which planning is underway.

Changing patient needs and altered nursing solutions have generated research projects from all nursing services. Currently 12 studies are in progress ranging from periodontal disease in diabetes to factors influencing pulmonary artery and capillary wedge pressures to eating behaviors during neuropsychological testing. Clinical nurse specialists with doctorates serve as mentors and resource persons for clinical nurses initiating research questions. In addition, the Nursing Department continues to develop a collaborative relationship with the National Center for Nursing Research.

As a result of more than 140 extramural presentations, members of the Nursing Department staff are highly visible in the local and national nursing community. More than 20 members of the nursing staff received special awards, including admission to the Academy of Critical Care Medicine and nominations for Maryland Nurse of the Year. Publications in nearly 60 textbooks and nursing and medical journals documented the widespread contribution of the nurses in the Clinical Center. At the Nursing Department annual meeting, 81 staff nurses were honored for exceptional contributions to the nursing profession.

During FY '90, both the cancer and mental health nursing service presented national specialty conferences, attracting hundreds of nurses to the Clinical Center. Nurses from all over the United States and several foreign countries toured the Nursing Department and the Clinical Center. Tours were tailored to meet the special interests of groups such as nurse legislative interns, pediatric critical care nurses, and psychiatric specialists.

The Nursing Department continues to focus on recruitment and retention of the professional nurse. In FY '90, the turnover rate

fell to 12 percent, which is seven percent below the national average (AHA, 1990). During FY '90, the Nursing Department recruited 136 FTEs. In addition, three service chiefs were recruited to fill these essential positions within the department. The use of costly contract nurses on cancer and 2J SICU was phased out. Many of these contract nurses were eventually recruited to join the Nursing Department staff.

Educational programs initiated by the Nursing Department aim to serve both the nursing staff at the Clinical Center and to attract nurses from the community. Comprehensive orientation programs ensure a smooth transition to Clinical Center nursing for both the new graduate and experienced nurse. Staff development classes in areas such as nursing research and physical assessment keep Clinical Center nurses at the forefront of nursing practice. The cancer training program, the neuroscience internship program, and the professional update program provide a source of motivated and skilled nurses for recruitment to the Nursing Department.

Nutrition

The Nutrition Department provides meals and nutritional services to Clinical Center patients and provides snacks, beverages, and nutritional supplements to other departments and clinics for service to patients.

The department employs an average of 17 dietitians who provide nutritional assessment and counseling to patients on each patient care unit and clinic. Dietitians provided these services to more than 90 percent of the patients admitted to the Clinical Center in FY '90. With the assistance of the Office of Management Support Services, the department translated menus into French, Spanish, and Greek for the 200 foreign patients who visit the Clinical Center every year.

To facilitate food services to patients, a two-week cyclic menu is planned for 99 diet modifications. Food choices offered on menus reflect current guidelines for healthy eating and foods suggested by patients as favorites. Breakfast, lunch, dinner, and snacks are prepared daily in the main kitchen by a staff of skilled cooks. An automatic tray assembly line helps food service workers and supervisors assemble patients' selections for meals. Food service workers served about 1,100 meals and snacks per day to patients at their bedside during FY '90.

The department's internal computer system helps department managers and staff provide state-of-the-art food and nutritional services to patients and their families.

Outpatient

The role of the Outpatient Department becomes even more crucial as clinic days can transform the Clinical Center into a version of National Airport at holiday time; the Outpatient Department kept the runways open for 152,000 outpatients seen in FY '90.

In addition to the 45 clinics that it manages, the Outpatient Department also is responsible for admissions, EKG, echo and stress laboratories, the travel and voucher office, local transportation, the messenger and escort service, and the Ober United Travel Agency. Each section provides special services to Clinical Center patients to ensure smooth and efficient progress through inpatient and outpatient areas.

In FY '90, a state-of-the-art 8th floor clinic for outpatient treatment and care of patients with AIDS opened.

The admission section is the first stop for all new inpatients and outpatients. They are greeted by a supportive staff that ensures the accuracy of all admissions information. The staff also is the administrative liaison between the Clinical Center personnel who are on call after hours, on weekends, and on holidays.

The medical clerks in each of the nine outpatient clinics provide administrative support, supplies, and medical equipment for the professional staff. The medical clerks greet patients upon their arrival to the clinics and help them through a whirlpool of confusion.

The contract for the messenger and escort service has been in place for five years and has made a positive contribution to the hospital. The escorts are efficient and effective as they transport patients and specimens throughout the Clinical Center.

The Ober United Travel Agency offers convenient and friendly travel services for Clinical Center patients and NIH staff.

Patient Activities

The Patient Activities Department (PAD) provides therapeutic recreation and library services to patients and their families. The staff promotes the importance of recreation in the maintenance of a healthy lifestyle and in the improvement of the health of hospitalized persons. All services are designed to promote involvement, free choice, and enjoyment; are consistent with the patients'

assessed needs and limitations; and support the Clinical Center research effort.

The PAD staff orients newly admitted patients to the non-medical aspects of the hospital and to the community. Therapeutic recreators involve more than 1,000 patients and their families in a wide range of leisure activities each month. Since therapeutic recreators routinely participate in medical rounds and other patient care meetings, the patients are invited to participate in recreational activities that not only fill non-treatment time in a pleasurable manner, but also support identified emotional needs. The majority of the PAD effort is spent on bedside recreation, which often focuses on coping with the stress of illness and hospitalization.

The patient library provides a wealth of leisure reading as well as a significant collection of health and coping literature. Circulation averaged 866 books a month in FY '90, an 18 percent increase over the previous year. The distribution of magazines, audiotapes, and videotapes also increased dramatically. Increased services were due in part to the library renovation and additional hours of operation, which now include holidays.

Several new programs and services initiated in FY '90 include an all-hospital Halloween Haunted House, the "Look Good, Feel Better" grooming program for cancer patients, and adventure programming for attention-deficit children. Similarly, PAD initiated a staff privileging program that not only specifies the scope of service, but provides biennial review of staff credentials and job performance prior to renewal of privileges. The PAD quality assurance committee reviewed all adverse occurrences with an emphasis on improving patient safety and satisfaction.

Patient Representative

The challenge for the Patient Representative Program in FY '90 was to keep up with the changing pattern of admissions, diagnostic procedures, and treatment. A greater number of the patients contacted this year were new to the Clinical Center and many had little time to become acquainted with the unique aspects of a research hospital before being scheduled for sophisticated diagnostic procedures, critical surgery, or rigorous and debilitating therapy. Early orientation was clearly indicated to affirm that patients truly understood the research mission, had realistic expectations of the results of their participation, and were familiar with and prepared to exercise their rights. The dynamics of the surgical/intensive care waiting area also were changed with fewer surgeries being performed, but heightened anxiety for relatives awaiting the outcome of prolonged new procedures or toxic new therapies.

Trained and experienced patient representative volunteers, adapting as needed to the changing circumstances, oriented more than 1,400 new patients while continuing to monitor the waiting area and demonstrate the hospital's concern for and support of anxious families. The program director ensured the visibility of patient perceptions through staff orientations, participation on key committees, and periodic reports to the Office of the Director, as well as collaboration with other departments and services to resolve specific issues. The documentation of more than 1,800 patient encounters provided a profile of patient experiences that was useful in measuring patient satisfaction and locating trouble spots. The noticeable drop in serious complaints received from patients this year may be in part be due to a heavy emphasis on early education, prompt reporting of minor difficulties, and timely and appropriate intervention by a responsive health care team.

Pharmacy

The Pharmacy Department serves all Clinical Center inpatients and outpatients who are undergoing any type of drug therapy. Clinical pharmacists are assigned such patient care areas as cardiology, mental health, oncology, intensive care, and internal medicine. These specialists work directly with patients and consult with professional staff regarding drug therapy.

A computerized network links all areas of the pharmacy and maintains detailed records of the quantity, dates, and times that drugs are dispensed to each patient. These extensive patient records are essential; the Pharmacy Department must account for every dose of investigational drug and maintain the integrity of customized drug regimens.

All investigational drugs dispensed to Clinical Center patients are registered and controlled by the department. Approximately one million investigational drug units are made and two million are registered and labeled each year. Tablets, capsules, or injections are prepared as required by the protocol. Pharmaceutical chemists test the potency and stability of the drugs manufactured by the Pharmacy Department.

The inpatient pharmacy mixes an average of 750 IV admixtures each day; however, there are some days when the workload exceeds 1,000. To prepare an admixture, the pharmacists add concentrated drugs to plastic bags containing sterile saline or dextrose in water. Intravenous solutions are prepared under rigorous standards of sterility and quality control by specially trained pharmacy personnel to ensure that none of the medications mixed in intravenous solutions interact or become unstable. To prevent contamination by

airborne materials, solutions are prepared in laminar flow hoods that filter out dust and bacteria.

The inpatient pharmacy dispenses close to one million unit doses of medicine each year. Most patients receive their medicines through a "unit dose" distribution system. To ensure that each patient receives the correct dose of the correct drug at the correct time, a 24-hour supply of unit dose medicines is placed in a drawer labeled with the patient's name and delivered to the nursing unit. Each dose is individually packaged, labeled, and protected from contamination up to the time it is administered. The unit dose distribution system is the safest and most reliable way to give medications to inpatients.

The outpatient pharmacy fills prescriptions for outpatients, as well as inpatients who are on pass or about to be discharged. The outpatient pharmacy fills approximately 400 prescriptions each day. Medications are mailed to patients who are in long-term studies and do not require frequent visits. The success of the treatment protocol depends on strict adherence to the directions of the prescribing doctor. To clarify any questions or misunderstandings, pharmacists counsel patients about their medications.

In FY '90, the 13th floor inpatient oncology pharmacy satellite became the focal pharmacy area for support to the day hospital program. The support of AIDS research and treatment continued to be a significant pharmacy effort involving about 15 percent of the department's personnel resources. The department also began exploring the possibilties of the Technology Transfer Act to share drug research information with private industry. Health education efforts in the outpatient pharmacy continued to increase. In addition to pamphlet racks, a patient reference library, and the "Drug Information" leaflets, a computerized patient self-reporting drug and medical history system is being tested. Within this system, a sophisticated data base will integrate the self-reported patient information with known allergies, adverse reactions, and disease states, and then provide a printout of the information.

Social Work

Unlike a community hospital where patients are likely to have their support structures close at hand, the Clinical Center hosts patients from around the world. It is therefore important that the Social Work Department fill gaps in support for patients far from their traditional networks of aid and comfort.

The department provides support services to all patients who come to the hospital and to the patients' families, offering ways to help restore, maintain, and improve health. The department's major

priorities are mental health, discharge planning, crisis intervention, rehabilitation, community liaison, and coping with the process of dying and death.

With knowledge of how psychological, social, and physical health factors may interact, social workers interpret individual responses to illness and hospitalization, and counsel accordingly. Clinical intervention helps each patient and family restore, sustain, or improve strength for coping in the present and planning for the future. In FY '90, the staff counseled more than 6,200 patients.

The HIV counseling program, located in the Social Work Department, coordinates HIV counseling services to newly diagnosed HIV-positive patients and active AIDS patients and their families. Transmission issues, financial and community resources, on-going psychosocial counseling services, and coordination of resources for patients returning to other states are available.

Staffed by a full-time director, the volunteer services program is an integral part of the department. It offers a wide range of volunteer opportunities to community people interested in assisting researchers, nurses, physicians, and other patient care specialists in delivering quality health care and emotional support to patients and families. In FY '90, 200 individuals volunteered more than 25,000 hours through programs sponsored by the Retired Senior Volunteer Program, American Red Cross, Clinical Center Volunteer Program, and special interest groups.

Volunteers provide many personal services that help patients and families adjust more easily to the hospital environment. In support service areas, volunteers provide foreign language interpreters, give general advice, provide some escort services, deliver mail and flowers to the bedside, answer telephones, assist patients with menu selection, provide refreshments to patients and families in waiting areas, and contribute to a variety of craft activities.

Spiritual Ministry

The Spiritual Ministry Department recognizes the integrity of persons and seeks to be supportive of patients and their loved ones during the challenging period of hospitalization and outpatient care. Health and well-being are not just physical; major faith traditions accentuate the influence of emotional, social, and spiritual components on one's health. In this perspective, clinicians within the department carry out the ministry of healing together with the persons who are ill.

The department is comprised of nine full- and part-time chaplains and one full-time secretary. Chaplains draw on the positive experiences of a patient's own religious or spiritual past, and offer assistance in discerning what negative religious associations may work against coping in this particular time in a patient's life. Ninety percent of patients declare a religious affiliation when entering the Clinical Center and a substantial percentage above that voluntarily consult with and draw upon the services of chaplains.

Clinical Center chaplains respond to the needs of patients and their families. The role of the chaplain is not to convert or formally teach. Rather, chaplains act as a companion in the healing journey and in spiritual seeking, use religious resources appropriate and meaningful to the patient, listen to the concerns of patients and their families, and offer guidance in questions of faith and observance. Chaplains make themselves available to patients and their families through personal visitation—an activity that may take the largest portion of the day. As a result, relationships are cultivated and the spiritual orientation and religious heritage of the patient are attended to in such a way as to complement the health care interventions of other health professionals.

Protestant, Roman Catholic, and Jewish chaplains comprise the department staff as these are the major faith groups seen in the Clinical Center. However, each institutional chaplain is trained to act as a liaison with a patient's own faith group and make arrangements for a patient of another religion to find support from his or her own faith group during hospitalization.

Religious rites and observances are another aspect of spiritual care. A volunteer staff liaison of the Muslim community leads prayers on weekdays in the interfaith Chapel on the 14th floor. In addition, Protestant services are held mid-week and Sunday mornings, Roman Catholic mass is celebrated daily, and Jewish Sabbath services are held on Friday afternoons. Memorial services are provided for individual patients and staff members, and small spiritual care groups meet in various areas of the Clinical Center for patients and families.

Chaplains participate in interdisciplinary meetings on nursing units, bioethics consultations, supervision of students learning the art of clinical ministry, educational forums, institutional review boards, and community outreach programs. In addition, chaplains represent NIH at various national organizations of both ecclesiastical and secular professionals and accentuate the connection between spirituality and health. Department staff frequently appear on educational panels and publish in journals, newsletters, and books.

In FY '90, the department continued to emphasize the relationship between health and spirituality, and the key concept of partnership in healing. Major planning took place for a conference to be held in the coming year during Pastoral Care Week with the theme of partnership, but with a singular emphasis on the patient as the focus of all health care endeavors.

Surgical Services

The Surgical Services Department (SSD) caters to all Clinical Center patients, encompassing inpatients and outpatients from all 14 institutes. The number of outpatients is increasing, reflecting a trend toward short hospital stays and ambulatory care. Approximately 75 percent of the surgical patients are from the National Cancer Institute, with a significant increase in operative procedures

from the National Institute of Neurological Disorders and Stroke, the National Eye Institute, the National Institute of Dental Research, and the new National Institute on Deafness and Other Communication Disorders.

SSD's main suite of operating rooms is located at the north end of the D wing on the second floor of the ACRF; the intra-operative radiation and photo dynamic therapy operating room suite is on the B3 level in the Radiation Therapy Department. An addition to the operating room suite will consist of one neurosurgical operating room, two general surgery rooms, and a cardiac catheterization facility. Occupancy of the new facility is scheduled for early 1991.

In FY '90, three services within NCI performed photo dynamic therapy procedures on 37 patients with cancers of the abdominal and chest cavities, the urinary bladder, and an extremity. The new operating room will allow the department to perform photo dynamic therapy in the main suite.

Two major purchases in FY '90 included an Argon LASER for ophthalmology and a YAG LASER for thoracic surgery, which will be utilized along with the older CO2 LASER. An Argon Pump-Dye LASER is used for photo dynamic therapy surgical procedures performed in the B3 radiation operating room.

The SSD staff remains stable with an increased enthusiasm generated by challenging new protocols. The acquisition of the new lasers promoted renewed interest in laser safety, inservice programs, outside seminars, and workshops.

Patient Support Services

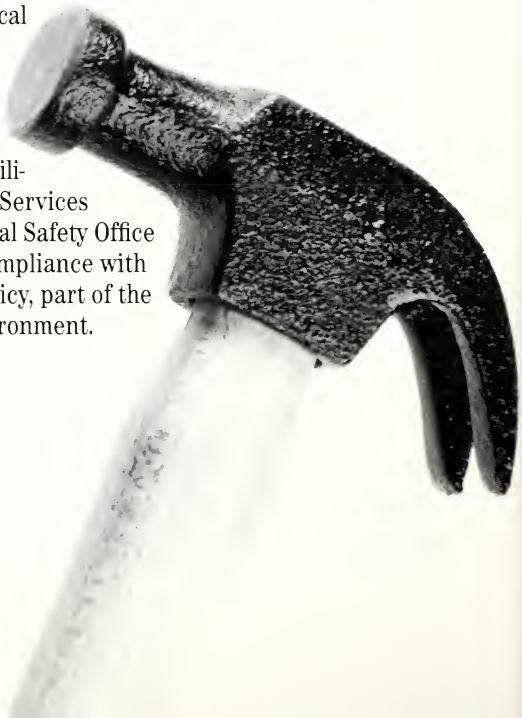
Building Services

The staff of the Building Services Office, with an annual budget of $4.5 million, oversees all construction and renovation projects. On new projects, the office checks drawings to ensure compliance with fire safety codes and standards as set forth by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Approximately 1,000 work requests are reviewed each year for funds approval as well as needs verification. In FY '90, a new method of submitting work requests was implemented through the DELPRO system, greatly enhancing the speed with which these requests are handled.

Major new building programs include the completion and occupancy of the new surgery addition, the design and pre-construction phase of the patient care unit (PCU) upgrades planned for FY '91, and the renovation of the 3 West, 4 West, 5 West, 5 East, and 8 West PCUs. Other major projects in FY '90 included the design and planning for the relocation of the Materials Management Department administrative office to facilitate the major renovation of their area and the completion of emergency repairs to the parking structure in preparation for major repairs scheduled for FY '92.

Twice a year the Building Services Office coordinates emergency power tests for the hospital with the Division of Engineering Services. The Clinical Center is one of the few hospitals in the country that can switch to emergency power under controlled conditions to test the emergency generators.

The Building Services Office instituted the "Clean Sweep Program." The purpose of the program is the monthly surveillance of corridors within the Clinical Center to monitor and arrange for removal of accumulated surplus supplies and equipment in order to comply with the Corridor Utilization Policy. The Building Services Office and the Environmental Safety Office work together to ensure compliance with the Corridor Utilization Policy, part of the maintenance of a safe environment.



Children's School

The NIH Children's School program was established to help patients continue their education while receiving medical treatment. The school is a fully accredited satellite member of the Montgomery County Public School System and is under contract with the federal government.

Ideally, the staff works from assignments provided by the teachers in the students' respective home schools with their own texts. This facilitates a smoother transition for the child from home into the health care environment. Contact with the home school gives the Clinical Center teachers the opportunity to advocate for the student and initiate helpful suggestions. When this is not possible, Clinical Center teachers tailor a curriculum for the student using Clinical Center textbooks.

The classroom is a bright, cheery room with computers and an array of books, supplemental material, and other tools that are available for the students. It provides the opportunity for them to meet other patients from other units, other states, and even other countries. Children who are unable to come to the classroom are taught on their units at bedside. Regardless of where they are taught, when the students are discharged they are ready to re-enter their respective schools with completed assignments and in step with their peers.

In FY '90, the school serviced 332 students representing most of the institutes. Students in kindergarten through the senior year of high school were taught along with some adults working toward their high school equivalence diploma, learning to read, or learning to speak English. The school program for NIMH is the only one that extends throughout the year. If Montgomery County extends its school year, the NIH Children's School will follow suit.

Hospital Safety

The mission of the Hospital Safety Program is to specify requirements for equipment, hazardous materials, facility maintenance, and construction, and to promote safe practices to reduce the hazards to patients, staff, and visitors. In FY '90, the Safety Office continued to focus efforts on enhancing the level of life safety for the occupants. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) accepted the 1989 progress report for life safety, a major compilation of efforts to reduce the risk of fire. Acceptance of this report was one of two major objectives necessary for awarding commission accreditation to the Clinical Center.

The Safety Office continued its collaboration with the Hospital Epidemiology Service to address the risk of occupationally acquired infection. The major compilation of observations and environmental contamination data was published in the *American Journal of Public Health.* One important result of this study was the identification of factors associated with hepatitis B virus contamination in biomedical laboratories at NIH. These results were used to devise strategies to reduce contamination and the subsequent risk of occupationally acquired blood-borne infection among laboratory workers.

The Clinical Center safety committee experienced a major change in its traditional hazard surveillance reports, reflecting a JCAHO trend toward safety effectiveness assessments. Surveillance activities now are summarized in quarterly reports that include indicators to measure compliance with hospital safety standards, safety awareness among the staff, and reduction in environmental hazards.

Highlights of these activities include the following. After attending orientation, 97 percent of new employees demonstrated an awareness of emergency procedures for fire, life-threatening illnesses, security alerts, and facility disasters. Nursing staff achieved an overall success rate of 99 percent during their fire evacuation drills. None of the formal recalls and safety alerts investigated by the committee were associated with adverse incidents in the Clinical Center.

The nearly complete transition to a new in-house equipment management computer system will enable the clinical care instrumentation section to maintain a current inventory of 4,000 pieces of clinical equipment. The system also will be used to detect trends in electrical safety and functional performance failures and costly repairs.

Activities also include surveys to assess occupational exposures to hazardous materials. Some of the assessments include environmental levels of ethylene oxide, a toxic sterilant gas used in central hospital supply; waste anesthetic gases; formaldehyde vapors in the anatomical pathology services; and lead in the potable drinking water. Data from these surveys indicate that contaminants are below the allowable threshold limits.

Environmental protection is another important component of the safety program. High-risk electrical transformers in building 10 vaults were successfully retrofitted to remove oil containing polychlorinated biphenyls (PCB). This action reduced the risk of fire and, subsequently, contamination with PCB. For the first time, the cost of hazardous waste disposal was factored into the review process for acquiring non-critical supplies. Products that enhanced waste minimization were purchased by central hospital supply. The safety committee endorsed the Montgomery County recommendation—soon to be regulation—that NIH increase the recycling of wastes. Currently, many departments voluntarily recycle paper, aluminum cans, and packaging materials.

Many employees participated in the annual PHS Disaster Medical Alert Team exercise. Because of Operation Desert Shield, the team provided additional medical support to the Department of Defense in North Carolina. Despite the heat and bugs, the team members quickly adapted to the outdoor accommodations and honed their skills in medical and environmental services.

Housekeeping and Fabric Care

The Housekeeping and Fabric Care Department (HFCD) strives to maintain a safe and sanitary environment in the hundreds of offices and patient rooms, six miles of hallway and public spaces, and more than 1,000 laboratories within the Clinical Center.

The 200 staff members provide quality fabric care services for patient care and research in the Clinical Center, other NIH installations on the Bethesda campus, the Poolesville animal farm, the Landau and Westwood buildings, the Baltimore Cancer Research Center, St. Elizabeth's Hospital, and The Children's Inn. In addition, they service the Clinical Center elevators, test various products and equipment, and cope with and study day-to-day environmental problems within building 10.

In FY '90, an interim laundry contract was awarded that enabled the fabric care section to continue to provide an effective laundry service. The closing of the service tunnel forced the department to abandon the exchange cart system for a par-stock-system, resulting in better service for patient care.

HFCD provides refresher training and certification in basic work procedures for all department supervisors and employees, and encourages upward mobility for all employees.

In FY '91, the department plans to acquire and implement the CAM-1 system, a computer program designed to increase housekeeping efficiency.

Information Systems

Established in 1983, the Information Systems Department (ISD) consolidates the planning, development, operations, and maintenance of Clinical Center computing activities. The department operates a computer center providing round-the-clock service to patient units, clinical pathology, pharmacy, radiology, admissions, and other departments engaged in administrative, diagnostic, and therapeutic activities. In addition, ISD provides advice and support to Clinical Center departments that have or are contemplating acquiring micro- or mini-computers, or other computer hardware or software.

ISD manages and operates the Clinical Center Medical Information System (CCMIS), a large "real-time" computerized system that provides access to patient records to retrieve and add data. Medical orders are entered directly by physicians or nursing personnel using video terminals that connect to a central computer. Patient information is displayed on video screens and printed for incorporation into the patient record.

CCMIS is used by 4,000 physicians, nurses, and others at work in the Clinical Center. Each year, ISD trains approximately 275 physicians, 300 nurses, and 550 other staff members to use the system. There are more than 250,000 patient biographical records on file, with complete clinical records retained on the system for all current patients. Each day 13,000 new entries are made to patient records. In FY '90, more than one million records were added to the system and a like number of vital sign entries; more than 10 million pages of patient medical records were printed. The total patient information on disk files, available for instant retrieval, exceeds one billion characters. In addition, patient data on 200,000 former Clinical Center patients are maintained at the Division of Computer Research and Technology for retrospective research studies.

To provide support for the wide range of CCMIS users, ISD maintains 25,000 screen display formats and hundreds of printout formats. Each year, ISD creates 5,000 new or revised screen formats and handles 40,000 telephone calls related to CCMIS support and enhancement.

During FY '90, researchers continued to apply improved methods for data extraction to facilitate data transfer between the CCMIS and their personal computers. Authorized users receive formatted lab and radiology results or other research-specific data elements on diskettes for transfer to data base systems for manipulation. This method of data transfer is encouraged for researchers requiring timely review of data for patient care.

During FY '90, a major project to consolidate the clinical laboratory computer system onto the main CCMIS computers neared

completion: the switchover from the old hardware, anticipated for early FY '91, will dramatically improve the reliability of this important system while maintaining or improving its functional characteristics. Considerable progress also was made on another major project involving substantial upgrade to the main CCMIS software system. The Clinical Center is an "alpha test site" for this new software, and the extensive and detailed testing process requires close technical cooperation with the vendor. When installed (sometime in the first half of FY '91), the upgrade will make it possible to retain much more patient data on the CCMIS, where the clinical staff can access it readily. Both of these projects provide necessary groundwork for many future improvements, as well.

The Macintosh version of the multifunctional terminal for the CCMIS reached an operational stage during FY '90. Offering several improved functions to the clinical staff, it will be installed on patient care units when procurement actions reach completion.

Other notable activities of FY '90 include expansion of clinical research data management functions; substantial progress on design and testing for Clinical Center local area networks (including initial installation of fiber-optic "backbone" cables); continued expansion of the use of personal computers (IBM-compatible and Macintosh) in Clinical Center departments, with particular attention to database development; and further work in planning and executing functional improvements in existing systems supporting such Clinical Center departments as transfusion medicine and nutrition.

Materials Management

The Materials Management Department is responsible for the management and control of supplies, equipment, and related services from acquisition to disposition.

The central hospital supply section provides a steady flow of patient care supplies to points of need, and returns soiled equipment and supplies to a central area where staff members either decontaminate, wash, sterilize, and reprocess the items for future use or dispose of the items.

The complex nature of the medical treatment methods employed at the Clinical Center requires the medical supply technicians to be knowledgeable of basic sciences to carry out processes that ensure thoroughly cleansed, properly packaged, and completely sterilized items used by physicians, nurses, and other health care professionals.

During FY '90, several of the medical supply technicians completed a comprehensive course in central service practice and received certification as central service technicians by the International Association of Hospital Central Service Management.

Supporting the central hospital supply section are the storage and distribution section, which is responsible for the receipt and distribution of supplies and equipment, and the purchasing and personal property management section, which purchases hospital items and accounts for all materials.

Both of these sections are modernizing their operations to become more efficient and responsive to the challenges created by rapid changes at the Clinical Center.

Medical Record

The Medical Record Department maintains and makes available a medical record for each Clinical Center patient. Some records contain only one or two sheets of paper; others are multivolume tomes equaling the *Encyclopedia Britannica* in size. The appropriate record must be made available for every clinic visit and hospital admission. Records also are used in medical and scientific research, and for medicolegal or administrative action. The medical record serves as a dynamic mode of communication describing the care of the patient, as well as providing continuous accounting of patient management.

In order to ensure the effectiveness of the medical record, the department must concern itself with systems for the maintenance, analysis, storage, and retrieval of medical records while preserving the integrity, privacy, and legality of the information they contain.

Medical record technicians work in every section of the department and perform most of the important technical functions that are crucial to day-to-day operations. Technicians analyze record documentation for compliance with standards established by the Joint Commission on Accreditation of Healthcare Organizations, code diagnoses and operative procedures for later research retrieval, inspect and maintain the microfiche of retired records, and process all requests for release of confidential information.

Medical record administrators are health professionals responsible for the overall management of the department, including its people, systems, and 220,000 medical records of patients treated at the Clinical Center since 1953. Administrators are responsible for establishing systems, data bases, and indices for treatment, research, health planning, and quality assurance. They develop departmental policies and procedures, supervise and evaluate employees, and provide expert advice regarding record management and related topics. Record administrators are health information managers who contribute their unique expertise in many areas of the Clinical Center community.

The scope of this effort can be appreciated by glancing at some figures for FY '90. Staff in the files section pulled more than 80,000 medical records for patient care, 20,000 for research, and filed more than 500,000 individual medical reports. The medicolegal section processed more than 6,000 requests for disclosure and dispatched more than 150,000 pages of medical information. Staff in the record processing section performed approximately 30,000 medical record analyses and processed close to 20,000 dictated medical records. The coding and retrieval section coded more than 900 research retrievals, 10,000 admissions, and 50,000 diagnoses and operations. The microfilm section processed more than 40,000 newly created microfiche. In addition, during the year the credentials and protocol services section staff processed appointments for more than 1,200 members of the medical staff and 900 research protocols.

Appendix

Medical Board

Representing the medical staff, the Medical Board develops policies concerning medical practice at the Clinical Center, receives and acts upon reports from various committees, and coordinates the general policies of clinical departments and services. The board makes recommendations to the Clinical Center director regarding medical staff appointments, clinical privileges, and corrective actions. Based on a continual assessment of the overall quality of patient care in the hospital, the board also recommends resources needed to provide quality clinical care.

Voting members of the board include clinical directors from the institutes with intramural clinical research programs, the Clinical Center deputy director, the Clinical Center executive officer, and the Clinical Center associate director for nursing. In addition, the chief of one of the Clinical Center's physician-headed departments is appointed for a two-year term. Ex officio non-voting members include the Clinical Center director, the NIH director or designee, a representative of the NIH General Counsel, and the executive secretary of the Medical Board.

Members

Dr. Bruce Baum, NIDR
Dr. Gregory Curt, NCI
Dr. David Rubinow, NIMH
Dr. Michael Frank, NIAID
Dr. Mark Shapiro, NIA
Dr. Mark Hallett, NINDS (chairman through December 1989)
Dr. James Balow, NIDDK
Dr. Harry Keiser, NHLBI (chairman since January 1990)
Dr. John Klippel, NIAMS
Dr. Markku Linnoila, NIAAA
Dr. Fernando Cassorla, NICHD
Dr. Robert Nussenblatt, NEI
Dr. Ralph Naunton, NIDCD
Dr. Steven Hollenberg, MSF
Mr. Raymond Becich, CC executive officer
Dr. Saul Rosen, CC acting director
Ms. Kathryn McKeon, CC associate director for nursing
Dr. Harvey Klein, CC, Department of Transfusion Medicine
Dr. Thomas Lewis, CC acting deputy director
Dr. Martin Goldenberg, CC, executive secretary of the board
Ms. Anna Mejia-Dietche, OGC
Dr. Philip Chen, OD/NIH

Report to the Medical Board

Introduction

The Clinical Center continues to respond to the call for change sounded at Easton II. Efforts begun by John Decker are being enhanced, as we work to invigorate the sense of shared purpose and collegiality. We seek continuous improvement while honoring our fiduciary responsibilities to clinical research and patient care. We appreciate the concern and efforts of those who participated in Easton II, the Clinical Center Budget Review Committee, and the many informal exchanges that provided us with valued guideposts.

This is the first of what we intend as an annual submission to the Medical Board chronicling the past year's major accomplishments and discussing plans for the coming year. Our objective is to improve communications and to encourage your participation in matters of mutual interest. Your comments on the form and content of this report will be appreciated.

Fiscal Year 1990

Overall, patient activity fell slightly compared to the previous year. A slight increase in admissions along with a decrease in average length of stay resulted in a six percent fall in total patient days to 98,300. Outpatient visits increased by two percent to 72,000, of which slightly over 4,000 were in day-hospital settings. Admissions of children continued to climb, particularly those below the age of two years. Diagnostic and therapeutic services per patient day increased slightly. The attached annual Management Indicators Report provides additional detail as well as year-to-year comparisons.

The Nursing Department performed well with fewer staff managing to support patients who have required more care. Staff recruitment and retention remained a central focus, although turnover was 12 percent compared to the 19 percent national average. The 136 new recruits filled vacancies predominantly on 13 East, 12 West, 11 East, 11 West, mental health, and special care units. Three service chief positions were filled, and the use of costly contract nurses was phased out without disruption.

The cardiac surgery program was closed in January, and NHLBI began planning for a bone marrow transplantation unit on 2 West. Our ability to care for sick children improved with the opening of a two-bed pediatric intensive care unit and the establishment of an affiliation with the Children's Hospital National Medical Center. New facilities were provided for the Department of Transfusion Medicine, ending a long period of scattered operations, while the NIAID AIDS program relocated to

a dedicated clinic on ACRF 8. Diagnostic imaging capacity remained a concern, although the start of evening and weekend operations in radiology increased scan availability to a small but important extent. The Clinical Pathology Department expanded its contract test services, and the Department of Transfusion Medicine continued to improve its bone marrow/gene therapy support capabilities. The information systems group successfully interfaced MIS with personal computers, establishing a foundation for improved clinical data presentation and analysis. Protocol tracking and services for credentialing of patient care providers were transferred to the Medical Record Department. At year end, there were 1,116 credentialed staff and 992 active protocols. Participation in ICRS meeting by bioethics program members has helped protocol quality and transit time.

Total Clinical Center costs for FY '90 were $187.4 million; $2 million from operational savings and $4.8 million of unexpended AIDS contingency funds were rebated to the institutes. Much of the operational savings is attributable to judicious use by the institutes of hospital services. Inventories were relatively high at year end. The cost allocation system was revised after mid-year, providing predictability by fixing an institute's full-year assessment before the end of the third quarter.

Fiscal Year 1991

Structured planning meetings with each clinical director provide the foundation for the projected Clinical Center FY '91 program. Cumulative projections for patient days and outpatient visits are 100,000 and 79,000 for the year, or approximately two percent and nine percent over the FY '90 levels. NCI and NIDDK plan full use of their day hospital facilities, perhaps achieving a combined total of 6,700 visits for the year. There was mixed interest in employing alternative care providers such as physician assistants, case managers, nurse practitioners, and specialty technicians, while there was general concern about the long-term viability of the clinical associate program. The Clinical Center welcomes the opportunity to explore all options and proposes joining in a review of the associate program by the Office of Medical Education and the Medical Board; all of us have important interests in hiring top-quality physicians.

We anticipate that more diagnostic imaging services will be available when the high-speed CT scanner (Imatron) is activated in the second quarter and the NMR In Vivo Center installs its second 1.5T scanner later in the year. Relocation of the Clinical Pathology laboratory computer system to the mainframe and installation of a major upgrade to the hospital information system will increase online storage capacity and facilitate access

to data for patient care and research. Multifunctional terminals for physicians and nurses will be placed on each patient care unit by mid-year, while demonstration projects involving the electronic transfer of ECG tracings and diagnostic images to high-demand locations should be in operation by summer.

Patient care unit renovations continue with special attention to safety issues. The 4 West and 5 West renovations are scheduled to begin in November, and 3 West and 5 East are to follow early in 1991. The 3 East, 8 West, 4 East, 9 East, 11 East, and 7 East units are next in line. Plans to redeploy excess space in the new surgery addition are under review by the Surgical Administrative Committee.

The FY '91 financial situation remains unclear but will likely be challenging. The revised Clinical Center budget process should provide a firm link between available funds and institute program plans. Beginning no later than January, clinical directors will receive monthly and quarterly reports comparing planned to actual patient activity and service use. Full-year institute assessments applied to the $209 million Clinical Center budget have been set based on service use in the fourth quarter of FY '89 and the first, second, and third quarters of FY '90. These assessments will not change for less than extraordinary circumstances, and then only to the extent that unplanned costs are actually accrued.

We believe that the budget climate will remain restrictive while research opportunities will likely increase over the near future. In order to do more with less, we are beginning a long-term, hospital-wide quality management program. The 3M Corporation is under contract to implement their "Managing Total Quality for Hospitals" program starting in late November, and 3M will work with Clinical Center administration to train all Clinical Center employees over the next two years. Additionally, we plan internal reviews of day hospital and clinic operations, the use of alternative care providers, the role and function of the pharmaceutical development service, in-house compared to contract-provided services, and supply expenses for patient care units. We have been given approval to establish a board of scientific counselors and will organize institute and clinical staff to join in planning for a replacement bed facility, which is currently envisioned as part of the infrastructure/building 10 modernization program.

Overall, we expect that modest clinical program growth can be accommodated within the Clinical Center budget, which was tentatively revised downward to a four percent growth rather than the planned 6.5 percent. Regardless, we are confident that we can keep costs down while maintaining quality services in support of a vigorous intramural research program.

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